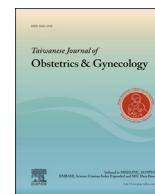


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## Case Report

## Complete involution of prenatally-diagnosed fetal scalp hemangioma

Eun Ju Jo<sup>a</sup>, Suk-Joo Choi<sup>a</sup>, Soo-young Oh<sup>a,\*</sup>, Byung Kwan Park<sup>b</sup>, Cheong-Rae Roh<sup>a</sup>, Jong-Hwa Kim<sup>a</sup><sup>a</sup> Department of Obstetrics and Gynecology, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, South Korea<sup>b</sup> Department of Radiology, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, South Korea

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## ABSTRACT

**Objective:** Scalp hemangioma is a rare benign fetal tumor. Here, we describe the detailed imaging features and natural course of a fetal scalp hemangioma until 1 year of age.**Case report:** We encountered a case of scalp hemangioma at 23 weeks' gestation by prenatal ultrasonography and magnetic resonance imaging. The mass persisted postnatally, but spontaneously regressed after birth.**Conclusion:** Proper diagnosis with prenatal ultrasonography and magnetic resonance imaging is important when a scalp mass is suspected *in utero*. Continuation of the pregnancy after appropriate counseling is prudent, considering the favorable prognosis and the rate of spontaneous regression of uncomplicated cases.

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## Introduction

Congenital hemangiomas are rare and were recently classified as neoplasms distinct from the more common capillary hemangiomas of infancy, in that they are mature at birth. Congenital hemangiomas are a vascular tumor subtype; the concept of which was introduced by Boon et al in 1996 [1]. The most common locations of the lesion are the limbs, head, and neck [2]. The incidence is higher in premature births (20%), female infants, Caucasians, advanced maternal age, multiple gestations, and with a history of chorionic villus sampling [3,4].

Congenital hemangiomas are subdivided into rapidly involuting congenital hemangioma (RICH) and noninvoluting congenital hemangioma (NICH). RICH is more frequent, and usually spontaneously involuted during the first 2 years of life. Conversely, NICH does not show any postnatal regression and therefore might result in cardiac failure, and requires surgical intervention more frequently [5]. RICH and NICH have many overlapping clinical features, such as appearance, location, size, and sex distribution.

Among the congenital hemangiomas, scalp hemangiomas are rarely reported. Here, we report a case of RICH that developed on a

fetal scalp diagnosed in the second trimester that involuted completely 1 year after birth.

## Case Presentation

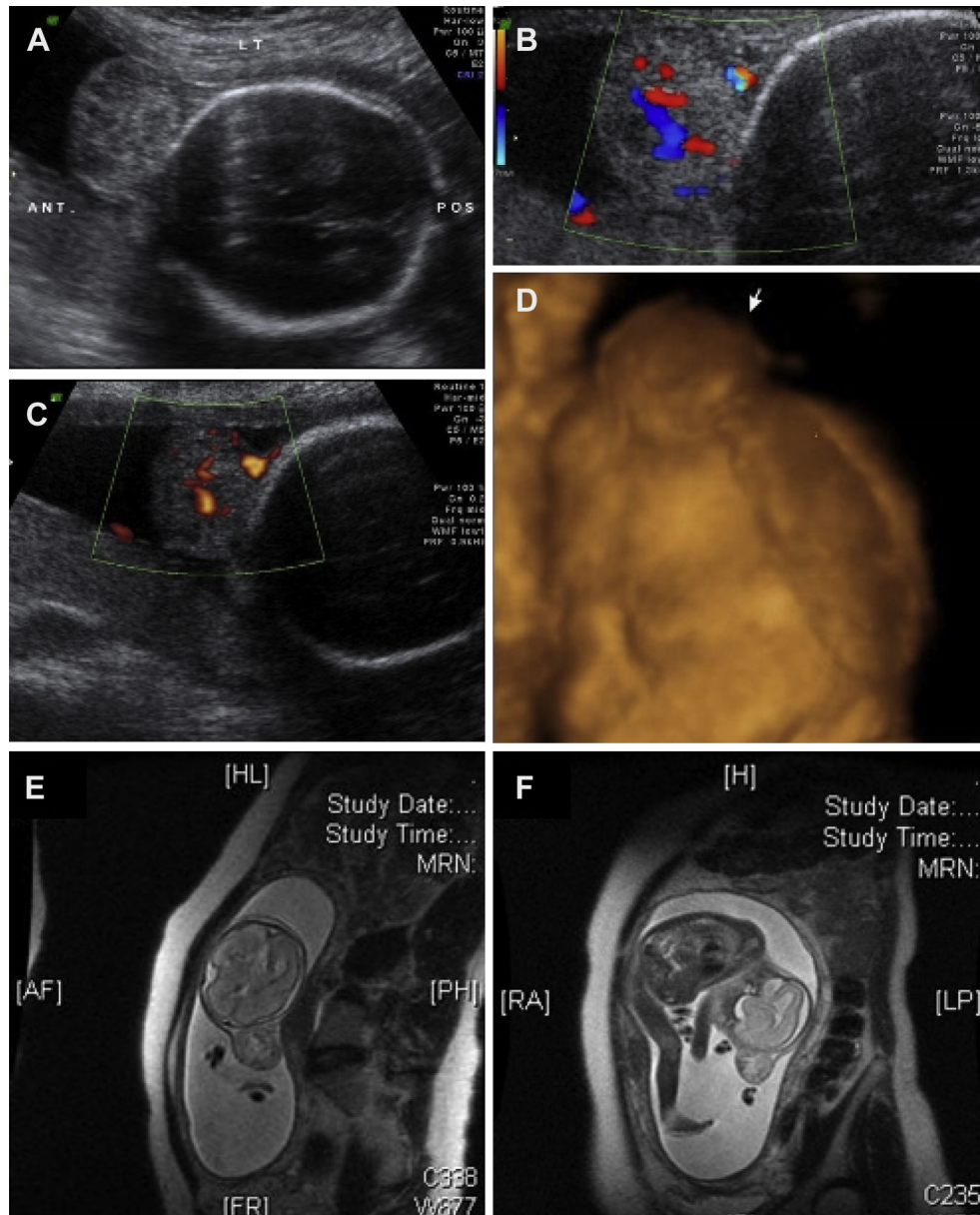
A 29-year-old primigravida woman was referred to our tertiary prenatal center at 23 weeks' gestation with a suspected fetal scalp mass. The patient had an unremarkable prenatal course until the scalp mass was noted at a second trimester screening ultrasound (US) examination performed at a local clinic. The US at our center, performed with a Voluson 730 Expert system (GE Medical Systems, Milwaukee, WI, USA), AB2-7 3D probe (MI 1.3, TIs 0.2) and RAB4-8L 2D probe (MI 1.2, TIs 0.1), revealed a single fetus in cephalic presentation. The placenta was located anteriorly, and the amniotic fluid volume was within the normal range. Fetal biometry was consistent with 23 weeks' gestation. Gray-scale US images showed a 3.0 cm × 3.0 cm echogenic round mass that was projecting from the front of the fetal scalp (Fig. 1A). Color/power Doppler images depicted vascular flow within the tumor but no microshunt (Fig. 1B and C). However, US did not clearly depict any skull defects or intracranial extension. To determine if there were associated calvarian or intracranial lesions, fetal magnetic resonance imaging (MRI) was performed with a GE Healthcare 1.5 Tesla MR imaging system (Milwaukee, WI, USA). Using a single-shot fast-spin echo technique, the T2-weighted MR images (TR 2080 ms/TE 88 ms) also showed a well-circumscribed hyperintense scalp mass with an internal signal void, suggesting intratumoral vessels or calcifications.

Conflicts of interest: The authors have no conflicts of interest to declare.

\* Corresponding author. Department of Obstetrics and Gynecology, Samsung Medical Center, Sungkyunkwan University School of Medicine, 50 Ilwon-dong, Gangnam-gu, Seoul 135-710, South Korea.

E-mail address: [ohsynd@skku.edu](mailto:ohsynd@skku.edu) (S.-y. Oh).<http://dx.doi.org/10.1016/j.tjog.2013.10.038>

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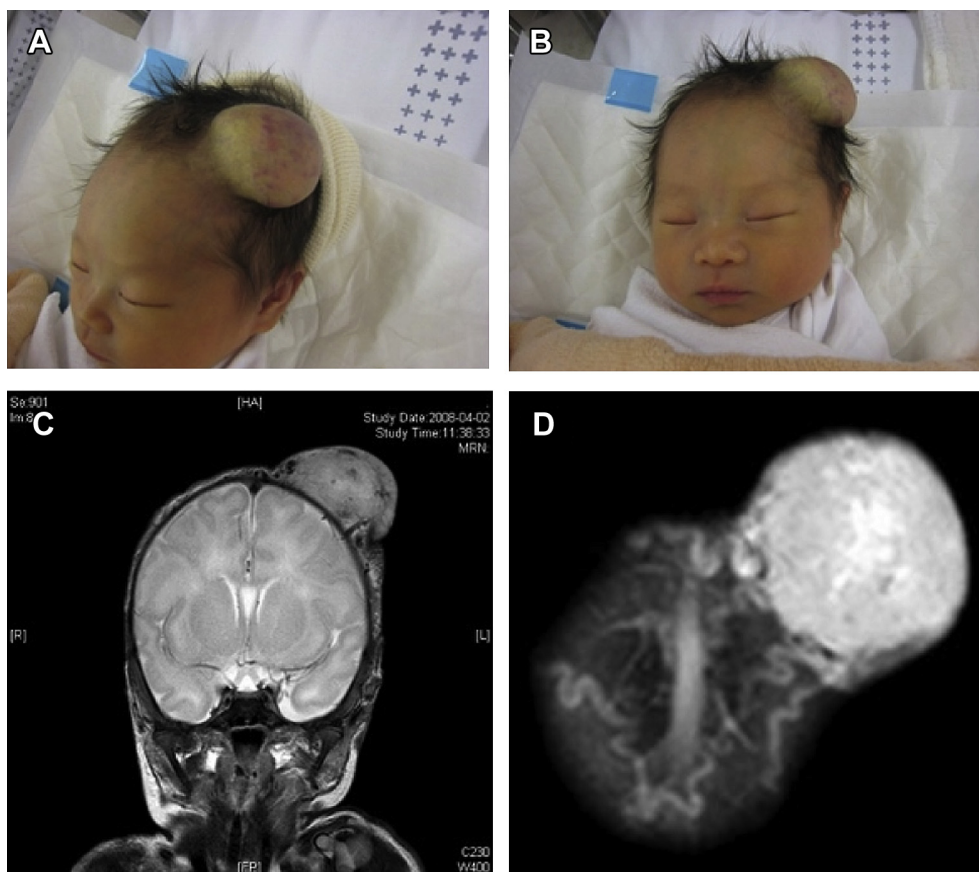
**Fig. 1.** US and MR images of the scalp mass at 23 weeks' gestation. (A) A transverse US image shows a 2.9 cm  $\times$  2.9 cm echogenic oval mass projecting from the frontal scalp. (B and C) Axial color/power Doppler images depicting blood flow in the tumor. (D) Three-dimensional multiplanar mode with surface-rendering shows the relative size and location of the scalp mass (arrow). (E and F) T2-weighted axial and sagittal MR images (TR 2080 ms/TE 88 ms) showing a hyperintense scalp mass that had suspicious signal void structures, suggesting vessels or calcifications. Note that the calvarium adjacent to the tumor is intact. MR = magnetic resonance; US = ultrasound.

No skull defects or abnormal intracranial lesions were noted (Fig. 1E and F). Fetal echocardiography was also performed and found to be normal. No associated anomalies were observed on level II US. Ultimately, the prenatal diagnosis of fetal scalp hemangioma was made.

After extensive counseling by multiple specialists, the couple was reassured with regard to continuing the pregnancy. Until 36 weeks' gestation, follow-up US scans at 4-week intervals showed no significant changes in the mass size, and no cardiac dysfunction was detected. At 38.3 weeks' gestation, an early delivery was scheduled due to suspected fetal growth restriction (estimated fetal weight: 2343 g, which was < 5th percentile at 38 weeks). Cesarean delivery was performed to avoid possible traumatic bleeding of the fetal scalp mass during vaginal delivery. A live baby girl weighing 2.41 kg was delivered with Apgar scores of 8 and 9 at 1 minute and

5 minutes, respectively. Neonatal physical examination showed that the head circumference was 32 cm. A 4-cm, bluish-purple, well-defined mass was present in the left parietal area; otherwise, the baby appeared normal (Fig. 2A and B). Acid–base assessment was performed on a doubly clamped cord from the umbilical artery and showed a pH of 7.289 and a base excess of  $-2.4$ . The infant's hemoglobin and platelet counts were 16.8 g/dL and  $268 \times 10^3$  cells/ $\mu$ L, respectively.

Postnatal MRI (Philips Medical Systems, TR 2000 ms/TE 10 ms/TI 1000 ms, Best, Netherlands) of the scalp mass during the neonatal period showed a mass with a heterogeneous appearance measuring 4.0 cm  $\times$  3.5 cm  $\times$  2.5 cm. The mass had intratumoral vessels with a high signal intensity component on the fat-suppressed T1-weighted image. It also demonstrated low signal intensity on the T2-weighted image, consistent with a



**Fig. 2.** A postnatal photograph showing the scalp hemangioma in the frontal region (A, B). A postnatal T2-weighted axial MR image (TR 2000 ms/TE 10 ms/TI 1000 ms) shows a 4 cm × 3.5 cm × 2.5 cm hyperintense scalp mass with signal void structures (C). A contrast-enhanced T1-weighted coronal MR image shows that it is a hypervascular tumor with strong enhancement (D). MR = magnetic resonance.

hemangioma. Additionally, the mass neither communicated with the intracranial space nor involved the brain parenchyma. These MRI findings were suggestive of a soft-tissue lesion containing blood products. The tumor arose from the left frontal scalp and did not result in a calvarian defect nor extend intracranially (Fig. 2C and D). After consultation with a neurosurgery team, the baby was discharged with her mother without excision, with the expectation of spontaneous regression.

At the 3-month follow-up visit, the scalp hemangioma demonstrated a significant decrease in size and showed regression

of the vascular component. Within a year, complete involution of the tumor had occurred (Fig. 3).

### Discussion

Congenital hemangiomas (RICH or NICH) are benign vascular tumors of the skin and other tissues that are fully developed at birth and commonly occur on the limbs, head, or neck [6]. Among the congenital hemangiomas, fetal scalp masses are rarely detected. Scalp hemangiomas have been reported to overlie the vertex,



**Fig. 3.** Follow-up images showing complete involution of the lesion at 1 year of age (arrow).



temporal, and/or occipital region [6–8]. US features suggestive of hemangiomas (infantile, RICH, and NICH) are high vessel density, high peak systolic velocity, homogeneous internal structure, sonographically visible vessels, and calcifications [4]. The presence of microshunts could lead to suspicion of NICH. NICHs are also called small arteriovenous malformations or arteriolo-capillary malformations because US shows microshunts [9]. Once a fetal scalp mass is detected, several conditions should be considered in the differential diagnosis, including cephalocele, epidermal cyst, mesenchymal sarcoma, cystic hygroma, encephalocele, brachial cleft cyst, hemangioma, lymphangioma, hematoma, lipoma, histiocytoma, teratoma, sequestered meningocele, and cephalohematoma [10,11]. The distinctive feature of cephalocele is a skull defect, which can be extremely challenging to visualize [12]. An encephalocele may appear sonographically as a thin-walled cyst, as a solid mass with a gyral pattern continuous with the cranium, or as a combined cystic and solid mass. When no calvarial defects are identified, the differential diagnosis for a juxtacranial mass should include teratoma, hemangioma, mesenchymal sarcoma, and cystic hygroma. Teratoma may be solid or heterogeneous, with no demonstrable gyral pattern. Cystic hygroma and lymphangioma are more typically cystic and have septae [10].

Recently, prenatal MRI has become a complementary diagnostic tool for the differential diagnosis of fetal scalp masses. The signal intensity on T1- and T2-weighted imaging provides additional information on the hemoglobin transformation sequence. The signal intensity of the mass in the present case suggested that the blood products mainly consisted of methemoglobin. The mixed signal intensity with a reticulated appearance on T1- and T2-weighted MRI was characteristic of a hemangioma. An area of flow voids was not observed in the mass, therefore, vascular malformation with high blood flow was excluded [13].

As expected, the prognosis of fetal hemangioma is affected by the size and location of the lesion, as well as the presence of associated anomalies. If the hemangioma is around the neck, it can cause polyhydramnios and dystocia, as well as airway obstruction or swallowing difficulties after birth. Large hemangiomas can be associated with hydrops [14], and more frequently coincide with life-threatening complications, including Kasabach–Merritt syndrome, congestive heart failure, and intra- and postoperative complications [15]. However, no hemodynamic complications such as congestive heart failure or hydrops have been associated with RICH of the skull, despite these hemangiomas being high-flow lesions. Tumors located on the skull appear to present a lower risk of hemodynamic complications than others [3].

In our case, the fetal hemangioma on the left frontal scalp was diagnosed at 23 weeks' gestation, and was not associated with any anomalies or other complications such as fetal cardiac dysfunction. Two cases including this case were diagnosed by prenatal MRI. Miyakoshi et al reported a case of occipital scalp hemangioma diagnosed by prenatal sonography and MRI. The MRI results indicated that the extracranial mass was heterogeneous in appearance

with predominant hyperintensity on T1-weighted and hypointensity on T2-weighted images without evidence of fat signals, suggesting a soft-tissue lesion containing blood products. Following counseling with regard to possible complications associated with hemangioma, termination of pregnancy was carried out in that case [13].

In conclusion, proper diagnosis with prenatal US and MRI is important when a scalp mass is suspected *in utero*. Continuation of the pregnancy after appropriate counseling seems prudent considering a relatively favorable prognosis and the spontaneous regression rate of uncomplicated cases.

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## References

- [1] Boon LM, Enjolras O, Mulliken JB. Congenital hemangioma: evidence of accelerated involution. *J Pediatr* 1996;128:329–35.
- [2] Fadel 2nd MF, Jones BV, Adams DM. Prenatal diagnosis and postnatal follow-up of rapidly involuting congenital hemangioma (RICH). *Pediatr Radiol* 2011;41:1057–60.
- [3] Elia D, Garel C, Enjolras O, Vermouneix L, Soupre V, Oury JF, et al. Prenatal imaging findings in rapidly involuting congenital hemangioma of the skull. *Ultrasound Obstet Gynecol* 2008;31:572–5.
- [4] Ozcan UA. Rapidly involuting congenital hemangioma: a case of complete prenatal involution. *J Clin Ultrasound* 2010;38:85–8.
- [5] Richard F, Garel C, Cynober E, Soupre V, Benifla JL, Jouannic JM. Prenatal diagnosis of a rapidly involuting congenital hemangioma (RICH) of the skull. *Prenat Diagn* 2009;29:533–5.
- [6] Fynn JK, Duckett R, Wardle SP, James DK. Vertex haemangioma: an unusual cause of intrapartum haemorrhage. *BJOG* 2005;112:120–1.
- [7] Bronshtein M, Bar-Hava I, Blumenfeld Z. Early second-trimester sonographic appearance of occipital haemangioma simulating encephalocele. *Prenat Diagn* 1992;12:695–8.
- [8] Sherer DM, Perillo AM, Abramowicz JS. Fetal hemangioma overlying the temporal occipital suture, initially diagnosed by ultrasonography as an encephalocele. *J Ultrasound Med* 1993;12:691–3.
- [9] Gorincour G, Kokta V, Rypens F, Garel L, Powell J, Dubois J. Imaging characteristics of two subtypes of congenital hemangiomas: rapidly involuting congenital hemangiomas and non-involuting congenital hemangiomas. *Pediatr Radiol* 2005;35:1178–85.
- [10] Bulas DI, Johnson D, Allen JF, Kapur S. Fetal hemangioma. Sonographic and color flow Doppler findings. *J Ultrasound Med* 1992;11:499–501.
- [11] Sepulveda W, Wong AE, Sepulveda S, Corral E. Fetal scalp cyst or small meningocele: differential diagnosis with three-dimensional ultrasound. *Fetal Diagn Ther* 2011;30:77–80.
- [12] Timor-Tritsch IE, Monteagudo A, Santos R. Fine-tuning the diagnosis of fetal scalp cysts: the value of high-frequency sonography. *J Ultrasound Med* 2008;27:1363–8.
- [13] Miyakoshi K, Tanaka M, Matsumoto T, Hattori Y, Minegishi K, Ishimoto H, et al. Occipital scalp hemangioma: prenatal sonographic and magnetic resonance images. *J Obstet Gynaecol Res* 2008;34:666–9.
- [14] Yoshida S, Kikuchi A, Naito S, Nakamura H, Hayashi A, Noguchi M, et al. Giant hemangioma of the fetal neck, mimicking a teratoma. *J Obstet Gynaecol Res* 2006;32:47–54.
- [15] Viora E, Grassi Pirrone P, Comoglio F, Bastonero S, Campogrande M. Ultrasonographic detection of fetal cranio-facial hemangioma: case report and review of the literature. *Ultrasound Obstet Gynecol* 2000;15:431–4.